

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 3596.02-1 PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/00598	International filing date (day/month/year) 11 JANUARY 1999	Priority date (day/month/year) 12 JANUARY 1998
International Patent Classification (IPC) or national classification and IPC IPC(7): C10L 1/18, 1/22 and US Cl.: 44/302, 411, 412, 447, 452		
Applicant WENZEL, DEBORAH		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

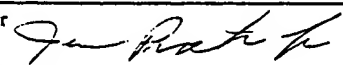
2. This REPORT consists of a total of 4 sheets.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 11 AUGUST 1999	Date of completion of this report 08 JUNE 2000
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer <div style="text-align: center;">  ELLEN MCAVOY </div>
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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/00598

I Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed☒ the description:

pages (See Attached)

pages , as originally filed

pages , filed with the demand

pages , filed with the letter of

☒ the claims:

pages (See Attached)

pages , as originally filed

pages , as amended (together with any statement) under Article 19

pages , filed with the demand

pages , filed with the letter of

☒ the drawings:

pages (See Attached)

pages , as originally filed

pages , filed with the demand

pages , filed with the letter of

☒ the sequence listing part of the description:

pages (See Attached)

pages , as originally filed

pages , filed with the demand

pages , filed with the letter of

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. ☒ The amendments have resulted in the cancellation of:☒ the description, pages NONE☒ the claims, Nos. NONE☒ the drawings, sheets/fig. NONE5. ☒ This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. statement**

Novelty (N)

Claims 1-29 YESClaims NONE NO

Inventive Step (IS)

Claims 1-29 YESClaims NONE NO

Industrial Applicability (IA)

Claims 1-29 YESClaims NONE NO**2. citations and explanations (Rule 70.7)**

Claims 1-29 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest the additive for a liquid combustible fuel as set forth by the amended claims. The closest prior art references appear to be Schon et al, U.S. Patent 5,004,479, and Itow et al, U.S. Patent 4,527,995 which pertain to microemulsion fuel compositions comprising (a) a hydrocarbon fuel such as diesel fuel, jet fuel, gasoline, or fuel oil; (b) water, and (c) a cosurfactant combination of methanol and a fatty acid partially neutralized by a nitrogenous base. However, the claims have been amended to exclude methanol as the primary water-soluble alcohol. Wenzel et al, U.S. Patent 4,083,698, also disclose fuel compositions for use in internal combustion engines comprising a water-in-oil emulsion of (a) a hydrocarbon fuel such as gasoline, diesel fuel or fuel oil, (b) water, (c) methanol, ethanol, isopropanol, or mixtures, and (d) a combination of surface active agents. However, Wenzel et al does not teach C4-C5 lower alcohols or C6-C12 middle alcohols as required by the claims.

NEW CITATIONS

US 4,083,698 A (WENZEL et al) 11 April 1978, see col. 1, line 15 to col. 8, line 21.
US 4,384,872 A (KESTER et al) 24 May 1983, see col. 1, line 54 to col. 3, line 48.
US 4,527,995 A (ITOW et al) 09 July 1985, see col. 1, line 36 to col. 6.
US 5,004,479 A (SCHON et al), 02 April 1991, see col. 3, line 40 to col. 5, line 15.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

I. BASIS OF REPORT:

This report has been drawn on the basis of the description,
page(s) 1-83, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the claims,
page(s) NONE, as originally filed.
page(s) NONE, as amended under Article 19.
page(s) NONE, filed with the demand.
and additional amendments:
Pages 84-91, filed with the letter of 07 March 2000.

This report has been drawn on the basis of the drawings,
page(s) 1-10, as originally filed.
page(s) NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the sequence listing part of the description:
page(s) NONE, as originally filed.
pages(s) NONE, filed with the demand.
and additional amendments:
NONE

5. (Some) amendments are considered to go beyond the disclosure as filed:
NONE

I CLAIM:

1. An additive for a liquid combustible fuel wherein the liquid combustible fuel is selected from the group consisting of gasoline, kerosene, diesel fuel, heating fuel and other liquid petroleum distillates, which additive comprises:
 - 5 (a) one or more alcohols selected from the group consisting of water soluble alcohols :
 - (i) ethanol in an anhydrous state, ethanol having between about 0.5 to 36% water by volume, ethanol having methanol up to 5% by volume of ethanol added, or ethanol having between about 0.5 and 36% water by volume and also having methanol up to 5% by volume of ethanol added,
 - 10 (ii) optionally n-propanol, iso-propanol, n-butanol, iso-butanol, n-pentanol or iso-pentanol, and
 - (iii) combinations of (a) (i) and a (ii);one or more of the following components selected from (b), (c) or combinations of
15 (b) and (c):
 - b. one or more alcohols selected from the group consisting of:
 - (i) straight-chain or branched-chain, saturated or unsaturated alcohols having between about 6 and 12 carbon atoms;
 - (ii) optionally straight-chain or branched chain, saturated or
20 unsaturated alcohols having between about 13 and 18 carbon atoms. and
 - (iii) optionally one or more ethoxylated alcohols selected from the group of alcohols having between 6 and 18 carbon atoms wherein the ethylene oxide add-on is less than 5 moles; and
 - (iv) combinations of (b) (i), (b) (ii) and (b) (iii); and
 - 25 (c) a fatty acid of the structure $R-(C=O)-OH$, wherein R is selected from alkyl, alkenyl or alkynyl having between about 10 to 24 carbon atoms, in combination with a source of nitrogen in an anhydrous state or as an aqueous solution selected from the group consisting of the ammonia, hydrazine, alkyl hydrazine, dialkyl hydrazine, urea, ethanolamine, monoalkyl ethanolamine, and dialkyl ethanolamine wherein alkyl is independently selected
30 from methyl, ethyl, n-propyl or isopropyl, wherein trialkylamines are excluded;
- wherein component a and one or more of components b, c, or combinations of b and c thereof as the additive when combined with mixing with liquid combustible fuel form a clear, stable microemulsion fuel composition having a viscosity similar to

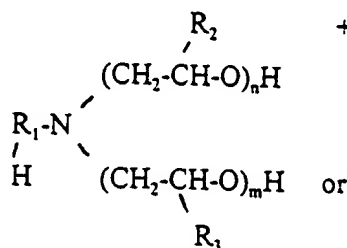
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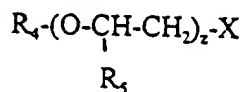
that of the liquid combustible fuel, and where the ratio of liquid combustible fuel within $\pm 10\%$ of the original viscosity of the fuel, additive ranges from about 50:50 to 99:1 by volume producing a microemulsion liquid fuel composition,

wherein said liquid fuel composition as a microemulsion excludes the presence of ethylene glycol, glycerine, polyethylene, polypropylene, added aromatic organic compounds, sulfur, sulfur compounds, metals, metal compounds, compounds of phenanthrene, and emulsifiers of the general formula:

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wherein R_1 and R_4 each independently is a saturated or unsaturated, straight-chain or branched hydrocarbon aliphatic radical each of 4 to 24 carbon atoms selected from alkyl or alkenyl or R_4 is alkylphenyl of 1 to 18 carbon atoms in the optionally branched alkyl chain or H; R_2 , R_3 and R_5 each independently represent a methyl group or H, n plus m is an integer from 1 to 20; z is an integer from 0 to 15; and X is

-COO(-) or -OCH₂COO(-), wherein, substituents R_2 , R_3 and R_5 are the same or different in different monomer units of each chain, and other organic diacids;

with the proviso that when the combustible fuel is gasoline component (c) is excluded and

with the proviso that when the additives for diesel fuel are anhydrous, component (c) is optional,

wherein the microemulsion formed meets existing U.S. Environmental Protection Agency (EPA) fuel property specifications for use in existing engines

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requiring little or no retrofit of the existing engines and when combusted emits reduced exhaust emissions to meet existing U.S. Environmental Protection Agency (EPA) exhaust emission specifications,

wherein said additives contain only atoms of carbon, hydrogen, oxygen and nitrogen.

- 5 2. The additive of claim 1 wherein the combustible fuel is gasoline wherein:
in subpart (a) the ratio of (a)(i):(a)(ii) is 100:0 to 50:50 where (a) (i) is anhydrous and water is excluded and straight-chain alcohols of (a)(ii) are excluded,
in subpart (b) the ratio of (b)(i):(b)(ii) is 100:0 to 50:50 where straight-chain alcohols of (b)(ii) are excluded and (b)(iii) is excluded, and
10 in subpart (c) is excluded.

3. The additive of claim 2 wherein the combustible fuel is gasoline wherein in the additive:

the ratio of subpart (a) and subpart (b) is between about 99:1 to 25:75.

4. The additive of claims 2 or 3 wherein the combustible fuel is gasoline wherein:
15 the ratio of liquid combustible fuel to additive is between about 99:1 to 80:20,

5. The additive of claims 2, 3 or 4 wherein the combustible fuel is gasoline,
in subpart (a) (i) the alcohol is only ethanol,
in subpart (a) (ii) the alcohol is iso-propanol and
in subpart (b) (i) the alcohol is a branched chain saturated alcohol having 6 to 12 carbon
20 atoms.

6. The additive of claims 2, 3 or 4 wherein the combustible fuel is gasoline,
in subpart (a)(i) the alcohol is only ethanol and water is excluded,
in subpart (a)(ii) the alcohol is only iso-propanol, and
in subpart (b)(i) the alcohol is 2-ethyl-hexanol-1.

- 25 7. The additive of claims 2, 3 or 4 wherein:
in subpart (a)(i) the alcohol is ethanol,
in subpart (a)(ii) the alcohol is isopropanol; and

12. in subpart (b)(ii) the alcohol is selected from branched chain saturated alcohols of C6-

8. The additive of claim 1 wherein the combustible fuel is selected from the group consisting of diesel fuel, kerosene, heating oil, or other petroleum distillates wherein;

5 in subpart (a) the ratio of (a)(i):(a)(ii) is between about 100:00 to 50:50 where (a)(i) is anhydrous and aqueous is excluded,

in subpart (b) the ratio of (b)(i):(b)(ii) + (b)(iii) is between and about 100:0 to 50:50,

in subpart (b) the ratio of (b)(ii):(b)(iii) is between and about 100:0 to 0:100, and

in subpart (c) is excluded.

10 9. The additive of claim 8 wherein:

the ratio of subparts (a):(b) is between about 60:40 to 40:60.

10. The additive of claims 8 or 9 wherein:

the ratio of combustible fuel:additive is between about 99:1 to 50:50.

11. The additive of claims 8, 9 or 10 wherein:

15 in subpart (a)(i) the alcohol is ethanol and water is excluded,

in subpart (a)(ii) the alcohol is iso-propanol,

in subpart (b)(i) the alcohol is 2-ethyl-hexanol-1 or C8-10 alcohols,

in subpart (b)(ii) the alcohol is branched-chain C13-18 alcohols, and

in subpart (b)(iii) the alcohol is C12-16 with 3 ethylene oxide add-ons.

20 12. The additive of claims 8, 9 or 10 wherein:

in subpart (a)(i) the alcohol is ethanol,

in subpart (a)(ii) is excluded,

in subpart (b)(i) the alcohol is a branched chain saturated C6 to 12 alcohol, and,

in subpart (b)(ii) and subpart b(iii) are excluded.

25 13. The additive of claims 8, 9 or 10 wherein:

in subpart (a)(i) the alcohol is ethanol,

in subpart (a)(ii) the alcohol is isopropanol,

in subpart (b)(i) the alcohol is a branched chain saturated C6-C12 alcohol, and

in subpart (a)(ii) the alcohol is iso-propanol or iso-butanol,
in subpart (b)(i) the alcohol is 2-ethyl-hexanol-1 or C8-10 alcohols,
subpart (b)(ii) and,
subpart (b)(iii) are excluded,

5 in subpart (c) the fatty acid is linoleic acid, oleic acid or combinations thereof, and
in subpart (c) the source of nitrogen is aqueous ammonia, urea or combinations thereof.

25. (Amended) The additive of claims 20, 21 and 22 wherein:

in subpart (a)(i) the alcohol is ethanol with 5% or less methanol,
in subpart (a)(ii) the alcohol is iso-propanol,

10 in subpart (b)(i) the alcohol is 2-ethyl-hexanol-1 or C8-10 alcohols,
in subpart (b)(ii) is excluded,

in subpart (b)(iii) the alcohol is C12-18 with 3 ethylene oxide add-ons,
in subpart (c) the fatty acid is linoleic acid, oleic acid or combinations thereof, and
in subpart (c) the nitrogen source is aqueous ammonia, urea or combinations thereof.

15 26. The additive of claim 1 wherein the additive is used as a fuel extender or as the
total fuel wherein:

in subpart (a) the ratio of (a)(i):(a)(ii) is between about 100:0 to 50:50 where (a)(i) is
anhydrous or 0.50 to 36% aqueous,

in subpart (b) the ratio of (b)(i):(b)(ii)/(b)(iii) is between about 100:0 to 50:50,
20 in subpart (b) the ratio of (b)(ii):(b)(iii) is between about 100:0 to 0:100, and
in subpart (c) nitrogen is present to neutralize between about 40-85% of the fatty acid.

27. The additive of claim 26 wherein the additive is used as a fuel extender or as the
total fuel wherein:

the ratio of subparts (a):(b) + (c) is between about 40:60 to 10:90, and
25 the ratio of subparts (b):(c) is between about 80:20 to 20:80,

28. The additive of claim 26 wherein the additive is used as a fuel extender or as the
total fuel wherein:

the ratio of combustible fuel:additive is between about 50:50 to 0:100.

29. The additive of claims 26, 27 or 28 wherein the combustible fuel is diesel fuel, kerosene, heating oil, or other distillates wherein:

- 5 in subpart (a)(i) the alcohol is ethanol with 5% or less methanol,
- in subpart (a)(ii) the alcohol is iso-propanol or iso-butanol,
- in subpart (b)(i) the alcohol is 2-ethyl-hexanol-1 or C8-10 alcohols,
- in subpart (b)(ii) the alcohol is branched-chain C12-18 alcohols,
- in subpart (b)(iii) the alcohol is C13-15 with 3 ethylene oxide add-ons,
- in subpart (c) the fatty acid is linoleic acid or oleic acid or combinations thereof, and
- 10 in subpart (c) the nitrogen source is aqueous ammonia or urea or combinations thereof.

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